

Full Length Research Paper

Prevalence of equine strongyle infection and its associated risk factors in Jimma Town, Southwest Ethiopia

Girma Sori¹, Tilahun Bekele^{2*}, Gurmu Geso¹, Hassennur Ibrahim¹, Fufa Gobena¹, Godana Jarso¹, Moa Melaku¹ and Ayalew Shumet³

¹School of Veterinary Medicine, College of Agriculture and Veterinary Medicine, Jimma University, Jimma, Ethiopia.

²School of Veterinary Medicine, Wollo University, Dessie, Ethiopia.

³Department of Pathology, Semera Regional Laboratory, Afar, Ethiopia.

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This cross-sectional study was carried out from November, 2015 to May, 2016 to determine the prevalence of equine strongyles and associated risk factors in Jimma town. Fresh faecal samples were obtained from 384 randomly selected horses (n= 287), donkeys (n= 67) and mules (n= 30). Coprological examination for the detection of strongyle eggs was performed using floatation technique. The overall prevalence of strongyle infection in all species of animals was found to be 26.56% (102/384). The infection rate was 24.74% (71/287), 38.81% (26/67) and 16.67% (5/30) in horse, donkey and mules, respectively. The prevalence of strongyles in Jimma town was 35.72%, 27.27 and 23.2% in animals at ≤3, 4-10 and ≥10 years of old animals, respectively. However, in terms of age sex and body condition score, no significant differences were found between infected animals (P > 0.05). In conclusion, equine strongyle infection was found to be important in the area hence; regular deworming and pasture management are recommended to reduce the worm burden of equine in the study area.

Key words: Jimma, coprology, equine, prevalence, strongyles.

INTRODUCTION

Equine endoparasites may be divided into three categories: nematodes or roundworms; cestodes or tapeworms and trematodes or flukes. Parasites are assigned to these categories according to their morphology or structure. Growth and life cycles of parasites within each group are generally distinct from those of the other groups. The roundworms are by far the most economically important internal parasites of equines (Yanzhen et al., 2009). They cause various degrees of

damage depending on the species and number at present, nutritional and the immune status of equids. They decrease the performance, production and productivity in the animals mainly in the reduction of body weight or failure to gain weight or even increase the mortality in acute case (Asefa et al., 2011). A number of studies conducted to detect association between poverty and animal diseases identified gastrointestinal parasitism as one of the most important problems for equids in

*Corresponding author. E-mail: bekele.tilahun2@gmail.com. Tel: +251913637536.

developing countries (Perry et al., 2002; Fikru et al., 2005; Valdez-Cruz et al., 2006). Internal parasites continue to be a significant threat to the health of equines. Even under proper management equines will become infested with internal parasites. Internal parasites of equines are of veterinary importance in many countries, where current methods of control rely almost entirely on the use of anthelmintics (Chapman et al., 2002).

Studies and observations conducted in the last two decades have pinpointed helminth parasites as being a major health hazard, limiting the overall performance of equines (Hinney et al., 2011). Equids are hosts to a great number of gastrointestinal parasite species, of which nematodes of the family Strongylidae, commonly called strongyle nematodes or strongyles, are the most important. These parasites are ubiquitous and live as adults in the large intestine of equids. Strongyle nematodes of equids (horse, donkey and zebra) are classified into the subfamilies Strongyliinae and Cyathostominae, sometimes categorized as large and small strongyles, respectively. Among the helminthes, large strongyles are most devastating parasites of equines (Pandit et al., 2008). These large strongyles are cosmopolitans in distribution. Again, of the three strongylus species, *Strongylus vulgaris* is the most important where the prevalence of this infection with one or more of these parasites approach 100% in foals (Kharchenko et al., 2009). *S. vulgaris* and *S. edentatus* are relatively common and *Streptococcus equinus* seems to have more sporadic distribution.

These parasites are important because they migrate in the circulation and vital organs and can cause severe damage that is fatal in some instances (Yanzhen et al., 2009; Ramsey et al., 2004). Diagnosis is based on the grazing history and clinical signs of loss of condition and anemia. Although oval, thin shelled strongyle eggs on fecal examination may be a useful aid to diagnosis (Shite et al., 2015). Despite the huge numbers of equine population and the increasing importance of equines (donkeys, horses and mules) in the Ethiopian economy, very little research relating to equine strongyle infection has been carried out. High and low prevalence of equine strongyle infection was reported by Haimanot et al. (2015), Molla et al. (2015), Getachew et al. (2010), Alemayehu, (2004) and Feseha et al. (1999) from Dangila Town, Menz Keya Gerbil District, east shewa and Aada, Akaki of East Shewa that revealed 5.73, 64.61, 100, 99 and 100%, respectively. Apart from these studies in other parts of Ethiopia, there has not been enough previous information on this infection in Jimma town, where equines are back bone of the economy of the study area. Therefore, the objective of this study was to determine the prevalence of equine strongyle infection in naturally infected horse, donkey and mule and to assess the associated risk factors of strongyle infection in Jimma town.

MATERIALS AND METHODS

Study area

The study was conducted at Jimma town, located 350 km south-west of Addis Ababa, capital city of Ethiopia. The town's geographical coordinates are 7°41' N latitude and 36°50' E longitude. The town is found at an average altitude of about 1,780 m above sea level. It lies in the climatic zone locally known as "Woyna Daga" (1,500 to 2,400 m above sea level) which is considered ideal for agricultural activities. The town is generally characterized by warm climate with a mean annual maximum temperature of 30°C and a mean annual minimum temperature of 14°C. The annual rainfall ranges from 1138 to 1690 mm. The maximum precipitation occurs during the three months period from June through August, with minimum rainfall occurring in December and January. From a climatic point of view, abundant rainfall makes this region one of the best watered of Ethiopian highland areas, conducive for agricultural production. The annual minimum and maximum temperature are about 14.4 and 26.7°C, respectively. The equine population of the area were found to be 2463 (1892-horses, 324- donkeys and 247-mules) (Adere and Tilahun, 2016).

Study design and animals

A cross-sectional study was conducted from November, 2015 to May, 2016 on equines by collecting their faeces to estimate the prevalence of strongyle parasites in Jimma town. Fecal samples were directly collected from the rectum of 384 equids (horses = 287, donkeys = 67 and mules = 30) of all age groups, body conditions and both sex groups. Simple random sampling technique was employed to select individual study animals. All animals included in this study were local breeds, kept under extensive management system used for packing and transportation.

Sample size determination

The sample size was determined by considering with no previous study in the area and by taking 50% prevalence. The sample size for the study was calculated using (Thrusfield, 2005) formula. Accordingly, a sample size of 384 equines was considered for the study.

$$N = \frac{(1.96)^2 Pex(1 - Pex)}{d^2}$$

Where: N = required sample size, Pex = recorded previous prevalence = 50%, d = desired absolute precision =5%

Sampling and coprological examination

The samples were collected directly from the rectum of the animals (equines) in to the disposal labeled container and transported to JUCAVM Veterinary Parasitology laboratory soon after collection. During sample collection the identity number, body condition score, age and sex for individual animals were recorded. The floatation technique (Shite et al., 2015) was employed to concentrate parasite eggs in the faeces and examined microscopically (10x and 40x) for presence of parasite ova following procedures described previously. Identification of the eggs was made on the basis of their morphology (Soulsby, 1986).

The age of the selected equines were determined by inspecting and estimating the incisor eruption times (Crane, 1997; Svendsen,

Table 1. Mean prevalence of strongyle infection according to different equine species.

Species	Total examined animals	No of positive animals	Prevalence (%)	P-value
Horse	287	71	24.74	0.028
Donkey	67	26	38.81	
Mule	30	5	16.67	
Total	384	102	26.56	

Table 2. The prevalence of strongyle infection in equines with respective categories of the risk factors in the study area.

Risk factors	No of examined animals	No of positive animals	Prevalence (%)	P-value
Age				
≤3years	28	10	35.72	0.37
4-10years	231	63	27.27	
≥10years	125	29	23.2	
Sex				
Female	48	12	25	0.79
Male	336	90	26.79	
BCS				
Poor	85	23	27.06	0.96
Medium	114	31	27.19	
Good	185	48	25.95	

1997). Therefore, equines were grouped into three age categories namely equines less than or equal to three years, four to ten years and greater than and equal to ten years of age. Similarly, for present study, body condition was scored as poor, medium and good according to Adere and Tilahun (2016).

Data analysis

The collected data during sampling and laboratory results was entered and stored in Microsoft Excel spread sheet 2007 (Microsoft Corporation, Redmond, Washington, USA) and SPSS (version 17; SPSS Inc., Chicago, IL, USA) was used to analyze the data. The data were thoroughly screened for errors and properly coded before subjecting to statistical analysis. Descriptive statistic was used to estimate the prevalence for strongyle nematodes in the study area. Risk factors such as age, sex and body condition were analyzed using the Pearson chi-square test. P value less than 0.05 was considered as statistical significant.

RESULTS

Prevalence of strongyle parasites in equine species

Out of 384 examined samples, 102 were positive for strongyle eggs. The overall prevalence for all horses, mules and donkeys was 26.56% (102/384). The infection rates were 24.74% (71/287) in horse, 38.81% (26/67) in donkey and 16.67% (5/30) in mules with a statistical

significant difference in prevalence among them ($P = 0.028$) (Table 1).

Prevalence of strongyle parasite according to age, sex and body condition score bcs of animals

The infection rates of strongyles in Jimma town were 35.72, 27.27 and 23.2% in animals at ≤3, 4-10 and ≥10 years of old animals, respectively, while in female and male animals the rates were 25 and 26.79%, respectively. The body condition of all species was also classified as poor, medium and good body condition scores. The prevalence according to body condition score was found to be 27.06, 27.19 and 25.95% in poor, medium and good body condition, respectively. However, in terms of age, sex and body condition score no significant differences were found among infected animals ($P > 0.05$) as indicated in Table 2.

DISCUSSION

In the current study the overall prevalence of strongyle infection was found to be 26.56%. The current finding was in agreement with Singh et al. (2015) reported as 27.33% in Punjab, India. It was higher than the reports of Haimanot et al. (2015) from Dangila Town which was

5.73%. In contrary the result was much lower than Molla et al. (2015), Getachew et al. (2010), Alemayehu (2004) and Feseha et al. (1999) from Menz Keya Gerbil District, east shewa and Adaa, Akaki of East Shewa that revealed 64.61, 100, 99 and 100% prevalence, respectively. This may be due to the presence of different geographical and climatic conditions and availability of anthelmintics between the study areas (Haimanot et al., 2015).

According to the current study the prevalence of strongyles in horses, donkeys and mules were 24.74, 38.81 and 16.67%, respectively. Based on this, strongyle infection is slightly higher in donkeys than mules and horses with a statistical significant difference ($P < 0.05$) in the prevalence of strongyle infections among study animals. This result is relatively similar to the reports of Feseha et al. (1999) and Ayele et al. (2006) who reported higher prevalence of strongyles in donkey with a prevalence of 100 and 87%, in Menagesha and Boset, Central Shoa, Ethiopia, respectively. Moreover, Zerihun et al. (2011) in Ethiopia and Seri et al. (2004) also, in Sudan reported a higher prevalence of strongyle infection about 99.15 and 70.1% in donkeys, respectively. The higher prevalence in donkey was may be because of their low economic value and the poor conditions of housing and management and lack of deworming practices. In the current study the prevalence of strongyle infection in mules (16.67%) was lower than donkeys (38.81%) and horses (24.74%). This result disagree with the works of Basaznew et al. (2012) who reported higher strongyle infection in mules (85%) than in donkeys (82.7%) but the data analysis showed no statistical significant difference in the prevalence of strongyle infections between mules and donkeys. This difference may be attributed due to the difference in equine management and agro-climatic conditions between the study areas.

Horses were highly susceptible for GI strongyles but in this study the prevalence of equine strongylosis in horses was low as compared to donkeys. The result was in agreement with Haimanot et al. (2015) and Samrawit (2016) who reported lower prevalence of strongyle infection in horse in Dangila Town, Northwest Ethiopia and Mersa town, respectively. The lower prevalence in horses seems to be attributed to a reduced possibility for grazing and thus contact with the infective stages of parasites or intermediate hosts. Further, as the horses are valuable, maintained under appropriate hygienic conditions and receive periodical veterinary care, this might also play a significant role in reduced parasitism as compared with donkey (Singh et al., 2015).

Data on age related prevalence of equine strongyle infection was 35.72, 27.27 and 23.2% in animals at ≤ 3 , 4-10 and ≥ 10 years of old animals, respectively, with no statistical difference ($P > 0.05$) among various age groups. Similarly no effect of age for the strongyle infection could be detected in other studies (Saeed et al., 2008; Francisco et al., 2009; Basaznew et al., 2012; Samrawit,

2016). This result disagree with works of Chitra et al. (2011) who reported that the level of strongyles and Ascarids increased when the donkeys became older, but then decreased. It may be due to the development of age immunity to strongyles and Ascarids in adult donkeys.

The present study reported that prevalence of equine strongylosis (25% in female and 26.79% in male) was not influenced by sex. It indicates lack of any statistical difference among the two groups ($P > 0.05$) and gender does not seem to play a role in this regard. This phenomenon is also observed by other workers under different management and climatic conditions (Jemal, 2008; Basaznew et al., 2012). The current study also revealed that the prevalence was 5.64, 4.35 and 8.33% in poor, medium and good body conditioned equines, respectively, with no statistical significance difference ($P > 0.05$) among these groups. This indicates that there is no relationship between BCS and strongyle infection in equine. Similar result was reported by many authors (Fikiru et al., 2005; Haimanot et al., 2015).

Conclusion

The present study indicated that equine strongyle infection to be the major problem in the study area being highest in donkeys followed by horses and mules. Hence this disease is an important health problem of the equines which is speculated to cause enormous economic losses through poor weight gain, reduce working ability, low performance and short life expectancy of working equines. The occurrence of strongyle infection was observed in different sex, age and body condition score of equines in this study. The climatic condition of Jimma town of Oromia region where rainfall is frequent and temperature is mild also favors the development and survival of infective larvae for most part of the years. Owing to the huge equines population in the study area considerable contamination to the communal pasture grazing system could be the other factor which favors the survival of the parasite. Animals of different age and sex group usually graze on communal pasture facilitated easy transmission of this parasitism. However, the problem due to strongyle nematodes of equines in the study area was given less attention because of its sub clinical nature. Hence, strategic deworming using full dose broad spectrum anthelmintic drugs and rotational grazing program should be implemented to reduce pasture contamination and infection. Further research should have to be conducted to identify the degree of drug resistance pattern and faeces should be cultured to identify the species of strongyle parasite present in the study area.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

- Adere F, Tilahun B (2016). Prevalence of equine lung worm (*D. arnfieldi*) and its associated factors in Jimma town, Southwest Ethiopia. *Adv. Lif. Sci. Technol.* 40:26-30.
- Alemayehu L (2004). Case study on reproductive activity of equines in relation to environment factors in central Ethiopia. PhD thesis, Germany, Berlin: Humboldt University of Berlin.
- Asefa Z, Kumsa B, Endebu B, Gizachew A, Merga T, Debela E (2011). Endoparasites of donkeys in Sululta and Gefersa Districts of Central Oromia, Ethiopia. *J. Anim. Vet. Adv.* 10(14):1850-1854.
- Ayele G, Feseha G, Bojja E, Joe A (2006). Prevalence of gastrointestinal parasites of donkey in Dugda Bora district, Ethiopia. *Livest. Res. Rural Dev.* 18:136.
- Basaznew B, Zelalem S, Mersha C (2012). Strongyle nematode infections of donkeys and mules in and around Bahirdar, Northwest Ethiopia. *Glob. Vet.*, 9(4):497-501.
- Chapman M, French T, Klien R (2002). Gastrointestinal helminthes of ponies in Louisiana: a comparison of species currently prevalent with those present 20 years ago. *J. Parasitol.* 88:1130-1134.
- Chitra R, Rajendran S, Prasanna D, Kirubakaran A (2011). Influences of age on the prevalence of parasitic infections among donkeys. Erode district, Tamilnadu, India. *Vet. Wor.* 4:258-259.
- Crane M (1997). Medical. In: The professional hand book of the donkey, 3rd ed. Whittet Books Limited, 18 Anley Road, London W14 0BY, pp. 19-36.
- Feseha GG, Alemu K, Friew I, Abule Y, Ketema A (1999). Donkey utilization and management in Ethiopia. ACP-EU Technical Center for Agriculture and Rural Cooperation (CTA), Wageningen. Donkey, People and Development, pp. 46-52.
- Fikiru R, Teshale S, Bizunesh M (2005). Prevalence of equine gastrointestinal parasite in western highlands of Oromia, Ethiopia. *Bull. Anim. Health Prod. Afr.* 53(3):161-166.
- Fikru R, Reta D, Teshale S, Bizunesh M (2005). Prevalence of Equine Gastrointestinal Parasites in Western Highlands of Oromia, Ethiopia. *Bull. Anim. Heal. Prod. Afr.* 53(3):161-166.
- Francisco L, Arias M, Cortinas FJ, Francisco R, Mochales E, Dacal V, Suarez JL, Uriarte J, Morrondo P, Sanchez-Andrade R, Diez-Banos P, Paz-Silva A (2009). Intrinsic factors influencing the infection by helminthes parasites in horse under an oceanic climate area (NW Spain). *J. Parasitol. Res.* 516:173-175.
- Getachew MA, Trawford G, Feseha G, Geid JSW (2010). Gastrointestinal nematodes of donkeys (*Equus asinus*) in Khartoum state, Sudan. *J. Anim. Vet. Adv.* 3:736-739.
- Haimanot D, Addise A, Tilahun Z, Girma K (2015). Prevalence of Strongyle Infection in Horses and Donkeys in and Around Dangila Town, Northwest Ethiopia. *Acta Parasitol. Glob.* 6(1):14-19.
- Hinney B, Wirtherle NC, Kyule M, Miethe N, Zessin KH, Clausen PH (2011). Prevalence of helminths in horses in the state of Brandenburg, Germany. *Parasitol. Res.* 108:1083-1091.
- Jemal S (2008). The study on the prevalence of GI strongyles among equine species in and around Assela and to assess the magnitude of this parasitism in relation to age sex and management system. DVM thesis, Ethiopia, Debrezeit: Addis Ababa University.
- Kharchenko V, Kuzmina T, Trawfore A, Getachew M, Fiseha G (2009). Morphology and diagnosis of some forth-stage larvae of cyathostomines (Nematoda: Strongyloidea) in donkeys *Equus asinus* from Ethiopia. *Syst. Parasitol.* 72:1-13.
- Molla B, Worku Y, Shewaye A, Mamo A (2015). Prevalence of strongyle infection and associated risk factors in equine in Menz Keya Gerbil District, North-Eastern Ethiopia. *J. Vet. Med. Anim. Health* 7(4):117-121.
- Pandit BA, Shahardar RA, Jeyabal L (2008). Prevalence of Gastrointestinal Parasitic Infestation in Equines of Kashmir Valley. *Vet. Scan.* 3:22-24.
- Perry BD, Randolph TF, McDermott JJ, Sones KR, Thornton PK (2002). Investing in Animal Research to Alleviate Poverty. *Int. Livest. Res. Institute, Nairobi.*
- Ramsey YH, Christley RM, Matthews JB, Hodgkinson JEM, Goldrick J, Love S (2004). Seasonal development of Cyathostominae larvae on pasture in a Northern temperate region of the United Kingdom. *Vet. Parasitol.* 119:307-318.
- Saeed JZ, Qadir KA, Ahmed N (2008). Role of intrinsic and extrinsic epidemiological factors on stronglosis in horses. *J. Anim. Plant Sci.* 18:2-3.
- Samrawit M (2016). Study on the prevalence of equine strongyle in and around Mersa town of South Wollo zone, Amhara Regional State, Ethiopia. *Inter. J. Res. Inno. Ear. Sci.* 3(1):21-28.
- Seri HI, Hassan T, Salih MM, Abakar AD (2004). A survey of gastrointestinal nematode of donkeys (*Equus asinus*) in Khartoum State Sudan. *J. Anim. Vet. Adv.* 3(11):736-739.
- Shite A, Admassu B, Abere A (2015). Large Strongyle Parasites in Equine: *Rev. Adv. Bio. Res.* 9(4):247-252.
- Singh G, Singh NK, Singh H, Rath SS (2015). Assessment of risk factors associated with prevalence of strongyle infection in equines from Central Plain Zone, Punjab. *J. Parasitic Dis.* pp. 1-5.
- Soulsby E.J.L. (1986). Helminthes, arthropods and protozoa of domesticated animals. 7th edition, London, UK, The English language book society, pp. 650-700.
- Svendson ED (1997). Parasites Abroad. In: The professional hand book of the donkey, 3rd edition, London, UK, Whittet Books Limited, pp. 166-182.
- Thrusfield M (2005). *Veterinary Epidemiology*, 3rd edition, Oxford, UK, Black well sci. ltd, pp. 305-329.
- Valdez-Cruz MP, Hernandez-Gil M, Galindo-Rodriguez L, Alonso-Diza MA (2006). Gastrointestinal Parasite Burden, Body Condition and Haematological Values in Equines in the Humid Tropical Areas of Mexico. *Proceedings of the 5th International Colloquium on Working Equines The Future for Working Equines, The Donkey Sanctuary, Sidmouth*, pp. 62-72.
- Yanzhen B, Niu H, Gasser RB, Beveridge I, Zhang (2009). Strongyloid nematodes in the caeca of donkeys in Henan Province, China. *Acta Parasitol.* 54:263-268.
- Zerihun A, Bersisa K, Ayele G, Tesfaye M, Etana D (2011). Endoparasites of donkeys in Sululta and Gefersa districts of central Oromia, Ethiopia. *J. Anim. Vet. Adv.* 10(14):1850-1854.